McF 3M Opener

11. The number of franchises of a popular café has been growing exponentially since the first store opened in 1971. Since then, the number of stores has grown at a rate of 33% per year.

a) Explain how you could create an algebraic model that gives the number of stores in any year after 1971. Discuss how the information in the problem relates to your algebraic model.

b) Use your model to predict the number of stores in 2010.

Dec 7-8:09 AM

McF 3M Opener

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$P_{(n)} = P_{(0)}(1+r)^n$

$P(n) = 1(1.33)^n = 1(1+0.33)^{39}$

$= 1(1.33)^{39}$

$= 1(67641.6)$

$= 67641$

$P_{(0)} = 1$

$P(n) = ?$

$r = 0.33$

$n = 39$ (based in year 2010)

There are 67 641 stores by the year 2010.

Dec 7-8:09 AM

Exponential Decay

- something is decreasing exponentially
- ie radioactive decay ⇒ half life

$$P(n) = P_0(1-r)^n$$

P(n) ⇒ mass of a substance (presently)

P(0) ⇒ mass (original)

r = rate of decay

n = number of times it breaks down

May 15-10:12 AM

May 4-10:45 AM

ie 320mg of Iodine 131 is stored in a labratory for 40 days. The half life is 8 days. How much Iodine 131 is left after 40 days

$$P(n) = P_0(1-r)^n$$

$P(n) = ?$

$P(0) = 320mg$

$r = 0.50$

$n = 40/8 \Rightarrow 5$

May 15-10:21 AM

$$P(n) = P_0(1-r)^n$$

$= 320(1-0.50)^5$

$= 320(0.50)^5$

$= 320(0.03)$

$= 9.6mg$

May 15-10:24 AM

re 10 p 439

$$A(t) = 100\left(\frac{1}{2}\right)^{t/h}$$

a) $$A(t) = 100\left(\frac{1}{2}\right)^{6000/5730}$$

$$= 100\left(\frac{1}{2}\right)^{1.05}$$

$$= 100(0.48)$$

$$= 48$$

May 15-10:30 AM

10. Old Aboriginal wooden tools were found at an archaeological dig in the Brantford area. Carbon-14 dating was used to determine the age of the tools. Carbon-14 has a half-life of 5730 years. The general equation that models radioactive decay is

$$A(t) = 100\left(\frac{1}{2}\right)^{\frac{t}{H}}$$

where the initial radioactivity of the tools is 100%, t is time in years, $A(t)$ is the radioactivity of the tools today, and H is the half-life of the radioactive substance.

a) Archaeologists guessed that the tools were about 6000 years old. What percent of the present-day radioactivity would the tools emit if that were the case? Express your answer to the nearest tenth of a percent.

b) The tools' actual radioactivity was 56% of the radioactivity of the same type of present-day material. Determine the age of the wood to the nearest hundred years.

Dec 7-8:54 AM

b) $$A(t) = 100\left(\frac{1}{2}\right)^{t/h}$$

$$56 = 100\left(\frac{1}{2}\right)^{t/5730}$$

$$\frac{56}{100} = \frac{1}{2}^{t/5730}$$

$$0.56 = 1/2^{t/5730}$$

$$0.56 = 0.50^{t/5730}$$

$$(0.56)^{5730} = 0.50^{t}$$

$$0 = 0.50^{t}$$

$8^{1/3}$

$\sqrt[3]{8}$

$= 2$

p 437-440 q. 1a,2,3,6, 11 & 15

Test Thursday

May 15-10:37 AM